Colorado Department of Health

Hazardous Materials and Waste Management Division

Comments to: Final Phase I RFI/RI Work Plan for OU-13

April 1993

GENERAL COMMENTS:

1) The Division disagrees with the deposition of our comments regarding the number and location of surficial soil samples (Comment CDH #8, November 10, 1992). The statistical basis for the number of surficial soil samples, as presented in response to our comment, is not considered by the Division to be a valid approach to meeting any of the stage 1 objectives. The Division does not believe that a sufficient number of surficial soil samples have been proposed to assure that the stage 1 objectives will be attained The statistical approach for the surficial soil field sampling plan should be consistent with EPA Guidance and approved RFI/RI Workplans for similar OUs at the Rocky Flats Plant. This can be done by: 1) replacing Section 5 1.2 5.3 with the revised section contained in Attachment I; 2) modifying Table 6.2 and Figures 6-3 through 6-10 as shown in Attachment II, and 3) revising the text in section 6.3 as necessary to be consistent with items 1 and 2, above.

2) DOE's response to the Division's comment (CDH 1) regarding HPGe SOP has not been fully implemented in the Workplan. In the March 8, 1993 Response to Comments DOE states, "We have also revised Section 6 - Field Sampling and Analysis Plan to avoid the use of HPGe detectors for sampling beneath the pavement." However, section 6.3.1 of the Field Sampling Plan on page 6-38 indicates the HPGe survey is one of two methods to be used to characterize potential below pavement contamination. The second method is surficial soil samples. Neither the Field Sampling Plan or the Data Quality Objectives address how the HPGe survey would be conducted and results interpreted in paved IHSSs. The Division does not consider the HPGe survey to be capable of characterizing potential contamination located under pavement or other fill material. Therefore, the Data Quality Objectives (section 5 1.2.5.1) and Field Sampling Plan (section 6.3) for the Radionuclide Survey must be revised to clarify that the HPGe survey will not be used for characterization of potential contamination below pavement or other fill material. The surficial soil sampling program revisions proposed in General Comment 1 have been structured to begin radionuclide characterization under paved and fill covered IHSSs in

OU-13. The Division still considers the HPGe survey appropriate for screening potential surface contamination of soil and asphalt.

3) The Division disagrees with the deposition of our comments to the draft and final Workplans regarding Section 5.1.2 5. As stated in CDH November 1992 comments to that section, when ground water contamination has been confirmed at an IHSS, plume delineation will be necessary. One down-gradient well is not necessarily sufficient. The text must specifically acknowledge that complete plume delineation will occur. Plume delineation should be added to the stage 3 objectives for ground water in Table 5.2.

Colorado Department of Health

Hazardous Materials and Waste Management Division

Comments to: Final Phase I RFI/RI Work Plan for OU-13

April 1993

SPECIFIC COMMENTS:

1) In Sec 5.1.1.2 for the North Chemical Site (IHSS 117.1) on page 5-4 the text states, "The data shows no radionuclide contamination.", which appears to be inconsistent with revised Section 6.3.1.1 where data from borehole P214689 at IHSS 117.1 is reported to contain above background concentrations of several radionuclides. Please clarify/correct this apparent discrepancy between these sections of the Workplan.

2) Modification to the Workplan in response to CDH Comment #8(b) does not appear to be consistent regarding magnesium and beryllium at IHSSs 134(s) and 148. Soil at IHSS 134(s) will be analyzed for magnesium as indicated in Table 6-4, however this modification has not occurred in the text (page 6-44). IHSS 148 must be analyzed for beryllium, this is not indicated in Table 6-4 but has been addressed in modification to the text on page 6-51. Please correct these discrepancy between Table 6-4 and the text of the Workplan so that it is clear the Division's comment has been adequately addressed and that magnesium will be analyzed at IHSS 134(s) and beryllium will be analyzed at IHSS 148.

3) In section 6.2.2 (page 6-26). If, because of laboratory turn around time, complete analytical results for stage 1 sampling are not provided in Technical Memorandum 1, a target date for submittal of the remainder of the stage 1 data needs to be specified. The Division agrees that Technical Memorandum 1 should not be delayed waiting for complete stage 1 analytical results. However, it is not appropriate to defer reporting complete stage 1 results until the stage 2 Technical Memorandum is submitted The Division recommends that complete stage 1 results be reported in the Division within a reasonable time (i.e 30 days) after EG&G/DOE receipt of complete stage 1 analytical results.

Colorado Department of Health
Hazardous Materials and Waste Management Division
Review and Comments: Final Phase I RFI/RI Work Plan for OU-13
April 1993

ATTACHMENT I - TEXT TO REPLACE SECTION 5.1.2.5.3

5 1 2 5 3 **Surficial Soil Sampling** - As part of the Stage 1 sampling program, surficial soil samples will be taken at specific IHSS areas The objectives of the initial soil sampling plan ~~is to identify~~ include identifying elevated concentrations of possible contaminants and ~~to augment~~ augmenting the findings of the HPGe survey within each specific IHSS area in OU 13 These samples will be analyzed for TAL metals and a full suite of radionuclides plutonium 239 and 240, americium 241, uranium 238, uranium 233/234, tritium, strontium 89/90, strontium 90, cesium 137, radium 226, radium 228, gross alpha and gross beta In some cases, specific metals - lithium, beryllium and magnesium will be targeted for analysis at specific IHSSs One sample per group will be analyzed for gamma-emitting radionuclides with on site laboratory HPGe instruments At specific IHSSs where radioactivity has been detected, asphalt samples will also be collected and analyzed for radioactivity with a laboratory HPGe Laboratory analytical methods will confirm to those referenced in GRRASP, these methods meet the criteria for analytical Levels IV and V Field data collection will be in accordance with Environmental Management Division Manual 5-2000, Volume III, Geotechnical (RFP-EMD, 1992a) (An SOP for the laboratory HPGe is currently under development and will be completed and submitted for regulatory agency approval prior to use) Sample collection will proceed according to SOP GT 08 Any specific revisions to the procedures will be approved by the regulatory agencies prior to use

~~The surficial soils sampling problem is defined as detecting whether contamination is presented at each specific IHSS area.~~ One surficial soils sampling objective is to determine the presence or absence of contamination at each specific IHSS area. The maximum concentration for each constituent will be used to determine if elevated concentrations exist If elevated concentrations are identified, then more in-depth borehole and surficial soil sampling will be conducted in Stage 2 to characterize the nature and extent of

ATTACHMENT I - TEXT TO REPLACE SECTION 5.1.2.5.3

contamination and collect additional data to support a human health risk assessment

~~The following is the statistical approach used~~ **[Delete to End of Section 5.1.2.5.3]**

The number of samples required to meet stage 1 surficial sampling activity objectives for each IHSS in OU-13 were estimated using a statistical approach based on classical variability analysis (EPA 1989, 1990). The variability analysis resulted in a preliminary estimate that 25 or more systematically located surficial soil samples are needed to begin characterization of each IHSS. This estimate is independent of IHSS size and assumes a coefficient of variation of 0.59. It should therefore only be considered a rough estimate of the number of samples needed. The full number of 25 samples is only proposed at larger sites. In anticipation that later geostatistical analysis will indicate a need for fewer samples at smaller IHSSs less samples are initially proposed. For smaller IHSSs the actual number of initial soil samples is based on a triangular grid spacing of approximately 50 feet. This grid size was determined using professional judgement and is consistent with the approved RFI/RI Work Plans of other industrial area OUs with IHSSs of similar size. Table 5.5 shows the number of samples proposed at each IHSS. It is understood that based on site inspection, the actual location of surficial soil samples may be adjusted. In paved areas where soil sampling locations will be adjusted, where practical, to overlay soil gas sampling locations, thereby minimizing the number of holes cut through pavement.

The adequacy of the number of samples will be evaluated in Technical Memorandum 1. Should the computed power fail to meet the requirements for risk assessment, additional samples will be collected and analyzed during stage 2. The number of samples to be collected will be determined using variability analysis and the stage 1 coefficient of variation. The stage 2 samples will be located using geostatistical techniques and locations proposed

ATTACHMENT I - TEXT TO REPLACE SECTION 5.1.2.5.3

Table 5.5 SURFICIAL SOIL SAMPLING BY IHSS

IHSS	Total Number of Surficial Soil Samples	Number of Unique Samples(1)	Sample Analysis(3)
117.1	25	25	Metals, RAD
197	12	10	Metals, RAD
186	19	13	RAD
117.2	25	25	Metals, RAD
158	17	14	Metals, RAD
117.3	25	25	Metals, RAD
152	0	0	---
134(S)(2)	18	18	Metals, RAD
128/ 134(N)	8	8	Metals, RAD
171	14	11	Metals, RAD
148	22	22	Metals, RAD
157.1	17	17	Metals, RAD
TOTAL	**202**	**188**	

Notes

(1) Unique samples only counts samples located in multiple IHSSs once. At smaller IHSS, were less than 25 initial samples are proposed, the number of samples proposed is based on professional judgement and corresponds to an approximately 50 foot triangular grid.
(2) IHSS 134(s) includes samples to north of 134(s) up to but not including IHSS 171.
(3) Metals = TAL Metals ;RAD = Radionuclide.

ATTACHMENT I - TEXT TO REPLACE SECTION 5.1.2.5.3

in Technical Memorandum 1. If surficial soil sample results are not available for Technical Memorandum 1 they will be reported to the Division within 30 days of receipt of complete stage 1 surficial soil analytical results.

Note The following discussion is taken from the approved Final OU-10 Phase I RFI/RI Work Plan, page 4-13

The calculation of data needs for assessing variability were performed as follows

The prescribed margin of error and the acceptable error of estimation of the mean were identified The number of polygons to be sampled to estimate the population mean is a function of (1) the absolute margin of error that can be tolerated and (2) the acceptable confidence limits

The basic equation for estimating the number of samples according to Gilbert (1987) is the following

$$n = (t_{1-\alpha/2,n-1}\sigma/d)^2$$

where

n = number of samples required
n-1 = degrees of freedom
σ = s = sample standard deviation of the mean estimate
d = margin of error
$\alpha/2$ = one-sided confidence limit
$t_{1-\alpha/2\,n-1}$ = (1-α/2) quantile of the t distribution with n-1 degrees of freedom

Colorado Department of Health
Hazardous Materials and Waste Management Division
Review and Comments: Final Phase I RFI/RI Work Plan for OU-13
April 1993

ATTACHMENT I - TEXT TO REPLACE SECTION 5.1.2.5.3

Although a reliable value of σ is not available for determining n, an estimate of the relative standard deviation $\eta = \sigma / \mu$ (the coefficient of variation), may be roughly estimated Because this quantity is usually less variable from one study to another than the mean (μ), the approach suggested by Gilbert is to specify the relative error (dr) as $d_r = |x - \mu| / \mu$ such that

$$Prob[|x - \mu| > d_r \mu] = \alpha$$

Therefore, the equation becomes

$$n = (t_{1-\alpha/2, n-1} \eta / d_r)^2$$

where η must be pre-specified

For risk assessment, a reasonable bound on the error of estimation is 0 2 of the mean, i e , the 95 percent confidence interval around the mean is the mean plus or minus 20 percent of the mean This level of uncertainty is small relative to the uncertainty associated with toxicological parameters used to estimate risk

The η is first assumed as 0 59, which is common or relatively conservative in most soil sample data analysis Since $t_{1-\alpha/2\, n-1}$ depends on n, an iterative procedure should be used Using this approach, a sample size of 25 polygons is estimated as follows

ATTACHMENT I - TEXT TO REPLACE SECTION 5.1.2.5.3

$$n = (1\,708\ (0.59/0\,2))^2$$

$$n = 25$$

where the Student T variant is 1 708, the confidence limit is 0 05 for one-sided, and for 24 degrees of freedom

Since the number of samples is fully dependent on the estimated value of the coefficient of variation, the sample number 25 can be expected to result in a mean calculation within the 95 percentage confidence limit only for a coefficient of variation less than 0 59. If the actual coefficient of variation is higher than 0 59, the number of samples would have to be increased The preliminary estimate of 25 samples is also a prudent choice based on the Central Limit Theorem Many statisticians recommend that this theorem can be safely applied if n is at least 25 or 30 The mean values calculated from subsets of populations of this approximate size tend to be normally distributed, even if the sample populations are non-normal

Two performance measures that are commonly used to evaluate statistical sampling designs, such as the one presented here, are confidence level (α) and power (β) which are related to sample variability The confidence level can be used to determine the probability of a false positive or Type I error The power can be used to determine the probability of a false negative or Type II error For risk assessment purposes, EPA recommends a minimum confidence of 80 percent (Type I error = 20 percent) and a minimum power of 90 percent (Type II error = 10 percent) (EPA 1990) The confidence level used for this statistical analysis was 95 percent and the power is not considered However, a 95 percent confidence level provides a reasonable compromise between the probability of Type I and Type II errors

ATTACHMENT I - TEXT TO REPLACE SECTION 5 1.2 5.3

Once the number of samples is determined, the site is divided into 25 segments of equal size, and one sample is taken within each block This systematic sampling plan provides more uniform coverage of a site than simple random sampling does

Sampling variability affects the degree of confidence the risk assessor can expect Large variation of a contaminant in a medium indicates that the number of samples should be increased or that the samples of that medium should be stratified to reduce variability An estimate of the sampling variability that is a function of a spatial variation on the concentration of chemicals of potential concern is obtained by calculating the coefficient of variation, h, for each chemical (EPA, 1990) The coefficient of variation for stage 2 sampling will be estimated from sampling and analysis during stage 1

Colorado Department of Health
Hazardous Materials and Waste Management Division
Review and Comments. Final Phase I RFI/RI Work Plan for OU-13
April 1993

ATTACHMENT II - TABLES and FIGURES

This Attachment contains modifications to the following Table and Figures of the Final RFI/RI Work Plan for OU 13 - The 100 Area as discussed in Issue 1 - Surficial Soil Sampling Plan

- TABLE 6 2 OU 13 IAG Requirements / FSP Comparison (10 Sheets)
- FIGURE 6-3 IHSS Sampling Locations IHSS 117 1 & 197
- FIGURE 6-4 IHSS Sampling Locations IHSS 158 & 117 2
- FIGURE 6-5 IHSS Sampling Locations IHSS 117 3 & 152
- FIGURE 6-6 IHSS Sampling Locations IHSS 128 & 134(n) & 171
- FIGURE 6-7 IHSS Sampling Locations IHSS 134(s)
- FIGURE 6-8 IHSS Sampling Locations IHSS 148
- FIGURE 6-9 IHSS Sampling Locations IHSS 191 & 157 1
- FIGURE 6-10 IHSS Sampling Locations IHSS 186

TABLE 6 2 (Sheet 1 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
117 1	Provide documentation of materials/chemicals stored	NA	Provide documentation of materials/chemicals stored*	NA	In Agreement - Information Provided in Section 2 0
			Visual Inspection	NA	Identify visible contamination
			HPGe Radiological Survey	20 grid spacing	Investigate soil contamination indicated by Well P214689 - 100% coverage
	Soil Gas Survey	100 grid spacing	Soil Gas Survey	20 grid spacing	Improved Coverage additional analytes added based on available data
			Surficial Soil Sampling	25 ~~7 (11 within IHSS group which includes IHSS 197)~~	Investigate soil contamination with metals and radionuclides confirm HPGe survey
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Sample Existing Wells/Piezometers	2	Provide cost effective information regarding groundwater conditions
	Boreholes in Soil Gas Plumes	TBD	Boreholes in Soil Gas and Radiation Anomalies	TBD	In Agreement
	Boreholes (confirmatoin of soil gas)	TBD	Boreholes (confirmation of soil gas and radiation surveys)	TBD	In Agreement
	Monitoring Wells	TBD	Monitoring Wells	TBD	In Agreement
			Nested Tensiometers	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined •• This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 2 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No of Samples/Borings	Activity	No. of Samples/Borings	Rationale
117 3	Provide documentation of materials/chemicals stored	NA	Provide documentation of materials/chemicals stored*	NA	In Agreement Information Provided in Section 2 0
			Visual Inspection	NA	Identify visible contamination
			HPGe Radiological Survey	20 grid spacing	Investigate soil contamination indicated by Well P211689 100% coverage
	Soil Gas Survey	100 grid spacing	Soil Gas Survey	20 grid spacing	Improved Coverage additional analytes added based on available data
			Surficial Soil Sampling	~~11~~ 25	Investigate soil contamination with metals and radionuclides - confirm HPGe survey
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Sample Existing Wells/Piezometers	2	Provide cost effective information regarding groundwater conditions
	Boreholes in Soil Gas Plumes	TBD	Boreholes in Soil Gas and Radiation Anomalies	TBD	In Agreement
	Boreholes (confirmation of soil gas)	TBD	Boreholes (confirmation of soil gas and radiation surveys)	TBD	In Agreement
	Monitoring Wells	TBD	Monitoring Wells	TBD	In Agreement
			Nested Tensiometers	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ** This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 3 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IIISS Number	Activity	No of Samples/Borings	Activity	No. of Samples/Borings	Rationale
117 2			Visual Inspection	NA	Identify visible contamination
			IIPGe Radiological Survey	20 grid spacing	Investigate possible contamination indicated by IIISS history
	Soil Gas Survey	100 grid spacing	Soil Gas Survey	20 grid spacing	Improved Coverage additional analytes added based on available data
			Surficial Soil Sampling	25 ~~(11 within IIISS group which includes IIISS 158)~~	Investigate soil contamination with metals and radionuclides confirm IIPGe survey
			Vertical Soil Profiles	TBD	Aid interpretation of IIPGe survey
			Asphalt Sampling	5	Investigate contamination of asphalt
			Sampling Existing Wells/Piezometers	2	Provide cost effective information regarding groundwater conditions
	Boreholes in Soil Gas Plumes	TBD	Boreholes in Soil Gas and Radiation Anaomalies	TBD	In Agreement
	Boreholes (confirmation of soil gas)	TBD	Boreholes (confirmatoin of soil gas and radiation surveys)	TBD	In Agreement
			Nested Tensiometers	TBD	Increased Coverage
	Monitoring Wells	TBD	Monitoring Wells	TBD	In Agreement

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined •• This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 4 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
128, 134, 171	Reevaluate IHSS location	NA	Reevaluate IHSS location*	NA	In Agreement Information
			Visual Inspection	NA	Identify visible contamination
	FIDLER GM Radiological Survey	10 grid spacing	HPGe Radiological Survey	20 grid spacing	Improved Technology
	Soil Gas Survey	25 grid spacing	Soil Gas Survey	20'grid spacing 40 grid spacing over extension of IHSS 134	Improved Coverage additionnal analytes added based on available data
			Surficial Soil Sampling	14 ~~8~~ - 171 8++ IHSS group 128, 134N ~~171~~ 18 - 134(s) & 171	Investigate soil contamination with metals and radionuclides confirm HPGe survey
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Asphalt Sampling (Southern portion of IHSS 134)	4	Investigate contamination of asphalt
			Sample Existing Wells/Piezometers	3 IHSS 128 and IHSS 171 1 IHSS 134	Provide cost effective information regarding groundwater conditions
	Boreholes in Soil Gas Plumes	TBD	Boreholes in Soil Gas and Radiation Anomalies	TBD	In Agreement
			Monitoring Wells	TBD	Increased Coverage
			Nested Tensiometers	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ++ This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 5 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
148	Submit documentation of radiometric survey(s)	NA	Submit documentation of radiometric survey(s)*	NA	In Agreement - Information provided in Section 2 0
			Visual Inspection	NA	Identify visible contamination
	FIDLER GM Radiological Survey	10 grid spacing	HPGe Radiological Survey	20 grid spacing	Improved Technology
			Soil Gas Survey	20' grid spacing	Investigate VOC contamination of groundwater in area
			Surficial Soil Sampling	22 ++	Confirm HPGe results - Investigate soil contamination with Beryllium and Radionuclides.
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Asphalt Sampling	4	Investigate contamination of asphalt
			Sample Existing Wells/Piezometers	5	Provide cost effective information regarding groundwater conditions
	Soil Borings	TBD	Boreholes in Soil Gas and Radiation Anomalies and near OPWS	TBD - 1 near OPWI during stage 1	In Agreement
			Nested Tensiometers	TBD	Increased Coverage
			Monitring Wells	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ** This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 6 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
152			Visual Inspection	NA	Identify visible contamination
	Soil Gas Survey	20 grid spacing	Soil Gas Survey	40 grid spacing	Grid spacing sufficient to find large spills documented at the IHSS
			Sample Existing Wells/Piezometers	2	Provide cost effective information regarding groundwater conditoins
	Soil Cores/Borings	TBD	Soil Borings	TBD minimum of 3	In Agreement
			Nested Tensiometers	TBD	Increased Coverage
			Monitoring Wells	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ** This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 7 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
HISS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
157 1	Submit documentation of radiometric survey(s)	NA	Submit documentation of radiometric survey(s)*	NA	In Agreement - Information provided in Section 2 0
			Visual Inspection	NA	Identify visible contamination
	HDI FR GM Radiological Survey	25 grid spacing	HPGe Radiological Survey	20 grid spacing	Improved Technology 100% coverage
			Soil Gas Survey	20 grid spacing	Investigate VOC contamination of groundwater in area
	Surficial Soil Sampling	TBD	Surficial Soil Sampling	17 ++	In Agreement
			Vertical Soil Proviles	TBD	Aid interpretation of HPGe survey
			Sample Existing Wells/Piezometers	3	Provide cost effective information regarding groundwater conditions
	Soil Borings	TBD	Soil Borings	TBD	In Agreement
			Nested Tensiometers	TBD	Increased Coverage
			Monitoring Wells	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not licable TBD = To be determined ** This activity was pr ned during the preparation of this Work Plan

TABLE 6 2 (Sheet 8 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
158			Visual Inspection	NA	Identify visible contamination
	FIDLER GM Radiological Survey	25 grid spacing	HPGe Radiological Survey	20 grid spacing	Improved Technology 100% coverage
	Soil Gas Survey	25 grid spacing	Soil Gas Survey	20 grid spacing	Increased Coverage
	Surficial Soil Sampling	TBD	Surficial Soil Sampling	17 ~~5~~	In Agreement
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Sample Existing Wells/Piezometers	4	Provide cost effective information regarding groundwater conditions
	Boreholes in Soil Gas Plumes	TBD	Boreholes in Soil Gas and Radiation Anomalies	TBD	In Agreement
			Nested Tensiometers	TBD	Increased Coverage
			Monitoring Wells	TBD	Increased Coverage
169	Locate waste drum	NA	Document drum incident**	NA	Details of incident documented in Section 2 0

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ** This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 9 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

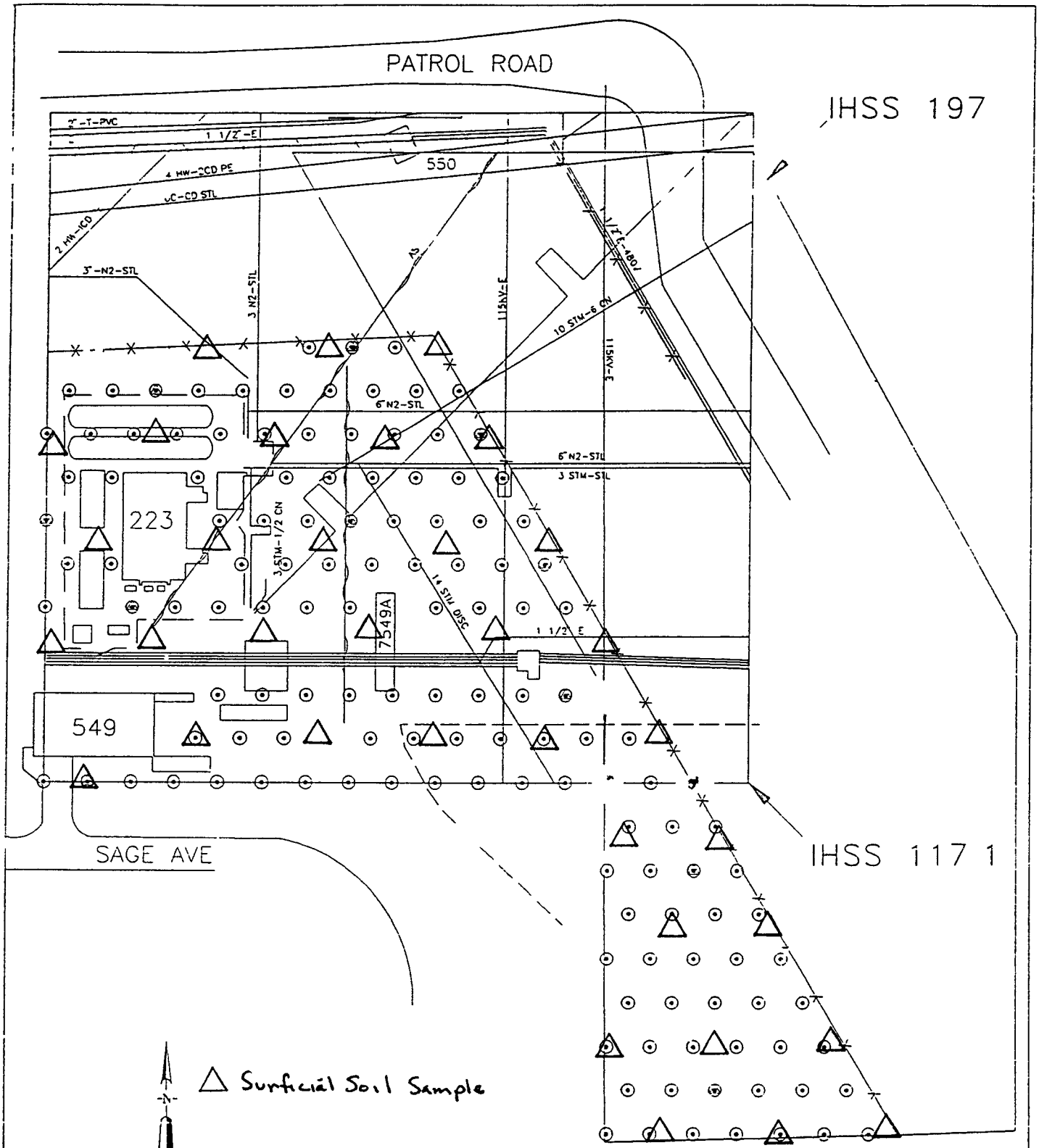
	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
186	Submit documentation of cleanup operations	NA	Submit documentation of cleanup operations*	NA	In Agreement information provided in Section 2 0
			Visual Inspection	NA	Identify visible contamination
			HPGe Radiological Survey	20 grid spacing	Increased Coverage to 100%
			Soil Gas Survey	20' grid spacing	Investigate VOC contamination of soils in area
			Surficial Soil Sampling	19 ~~++~~	Confirm HPGe results
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Sample Existing Wells/Piezometers	2	Provide cost effective information regarding groundwater conditions
	Soil Borings	TBD	Boreholes in Soil Gas and Radiation Anomalies - Boreholes along PWL	TBD 4 boreholes along PWL	In Agreement
			Nested Tensiometers	TBD	Increased Coverage
			Monitoring Wells	TBD	Increased Coverage
190	Submit documentation regarding nature of leaks	TBD	Submit documentation regarding nature of leaks**	NA	In Agreement
191	Submit documentation regarding nature of spill	TBD	Submit documentation regarding nature of spill**	NA	In Agreement

* Per modifications outlined in letter from G W Baughman, CDH, to T Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ** This activity was performed during the preparation of this Work Plan

TABLE 6 2 (Sheet 10 of 10)
OU 13 IAG REQUIREMENTS*/FSP COMPARISON

	IAG*		FSP		
IHSS Number	Activity	No. of Samples/Borings	Activity	No. of Samples/Borings	Rationale
197	Originally in OU 16		Included with the investigation of IHSS 117 1 at the request of Colorado Department of Health and the Environmental Protection Agency	NA	Response to EPA and CDH requestor
			Visual Inspection	NA	Identify visible contamination
			HPGe Radiological Survey	20 grid spacing	100 % coverage same as 117 1
			Soil Gas Survey	20' grid spacing	
			Surficial Soil Sampling	~~4~~ 12	Investigate soil contamination with metals and radionuclides confirm HPGe survey
			Vertical Soil Profiles	TBD	Aid interpretation of HPGe survey
			Sample Existing Wells/Piezometers	2	Provide cost effective information regarding groundwater condit ons
			Boreholes in Soil Gas and Radiation Anomalies	TBD	In Agreement
			Boreholes (confirmation of soil gas and radiation surveys)	TBD	In Agreement
			Monitoring Wells	TBD	In Agreement
			Nested Tensiometers	TBD	Increased Coverage

* Per modifications outlined in letter from G W Baughman, CDH, to F Lockhardt, DOE, dated February 10, 1992
NA = Not applicable TBD = To be determined ** This activity was performed during the preparation of this Work Plan

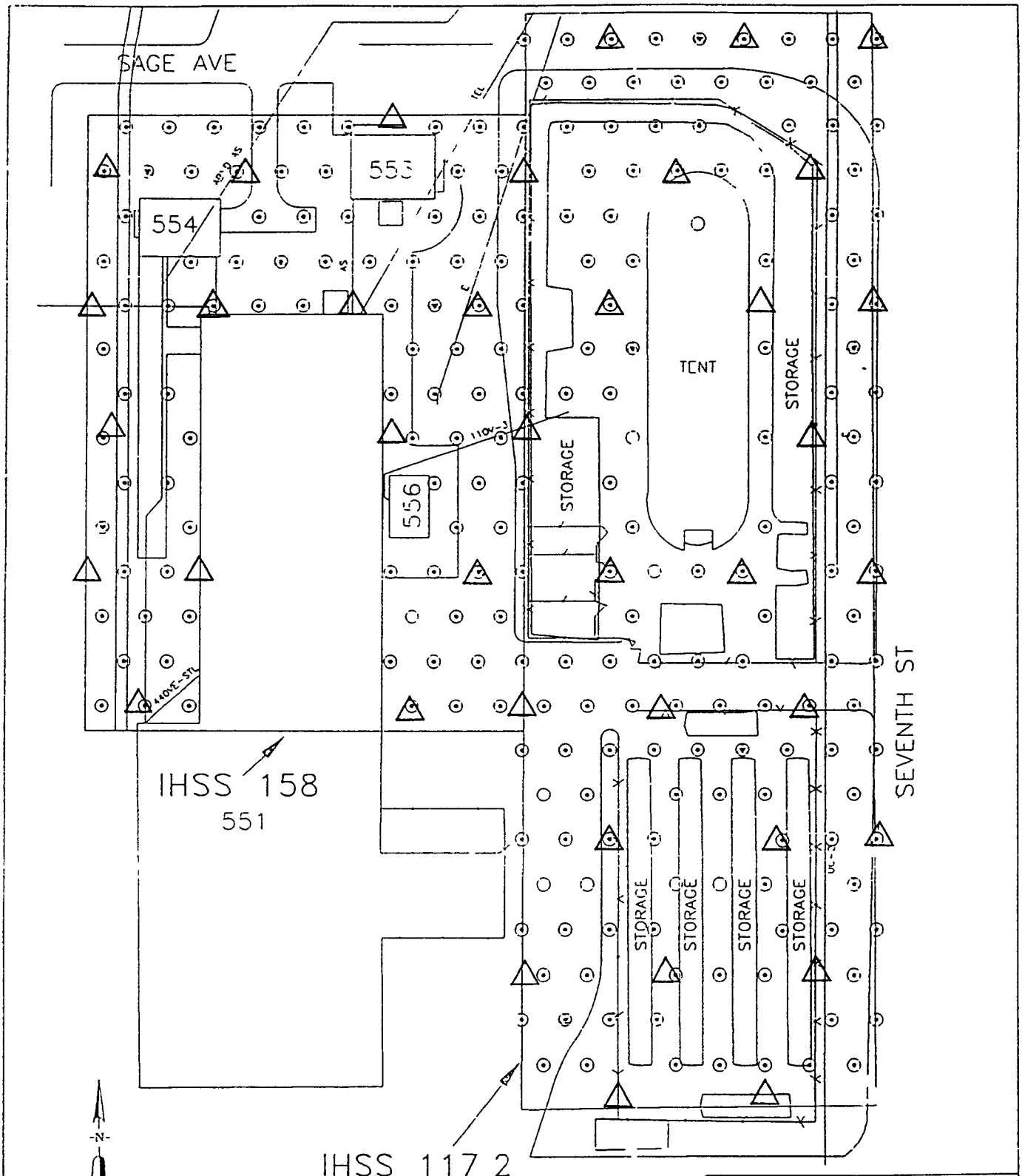


U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO 13
PHASE I RFI/RI WORK PLAN

FIGURE 6-3

IHSS SAMPLING LOCATIONS
IHSS 117 1 & IHSS 197

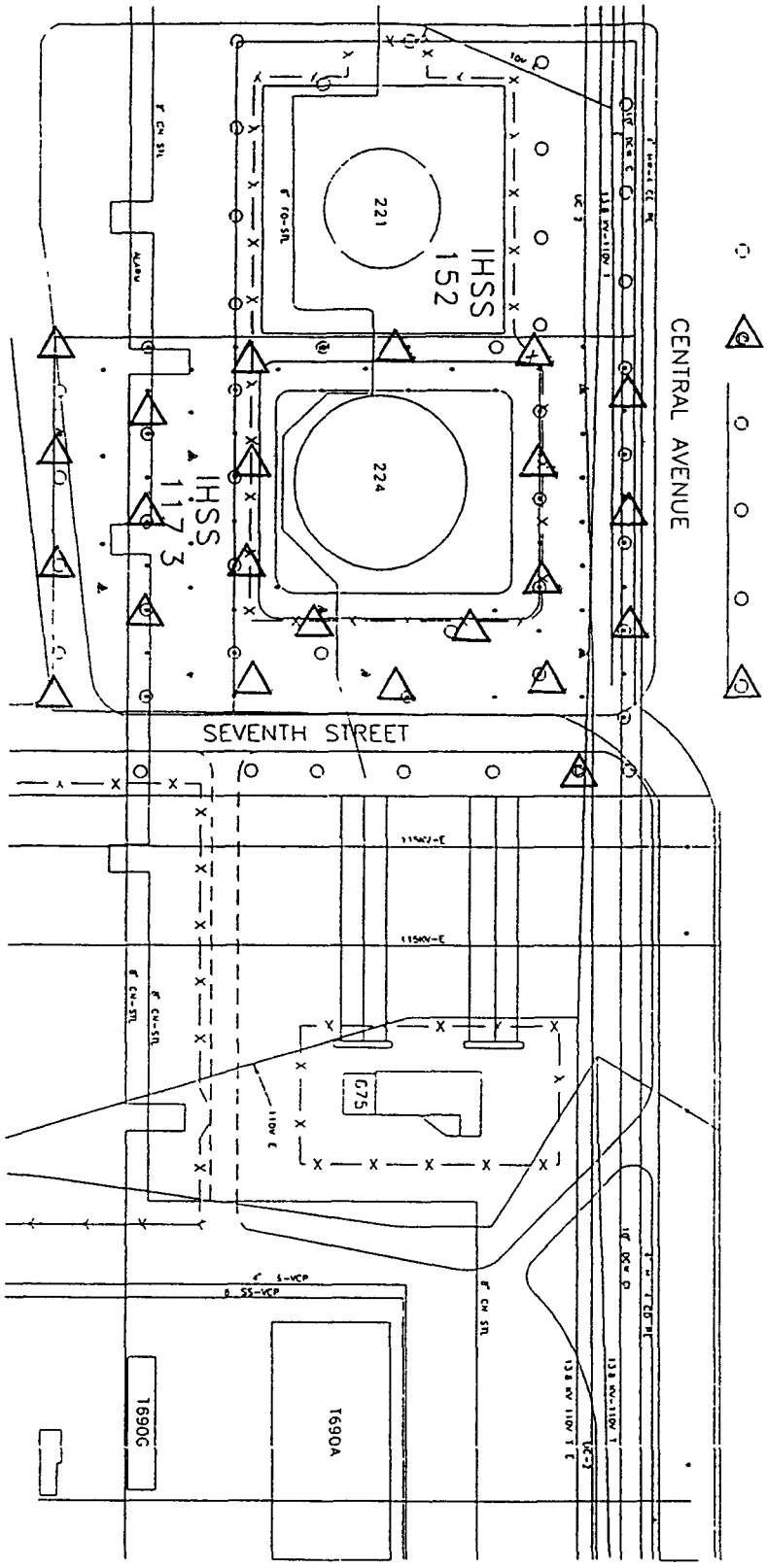


U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO 13
PHASE I RFI/RI WORK PLAN

FIGURE 6-4

IHSS SAMPLING LOCATIONS
IHSS 158 & IHSS 117 2



△ Surficial Soil Sample

- HPGe Station
- Soil Gas Survey Location
- △ Surficial Soil Sample

No Vertical profile samples may be taken at some HPGe stations contingent upon initial results

* Refer to Fig 2 2 MASTER LEGEND for explanation of symbol

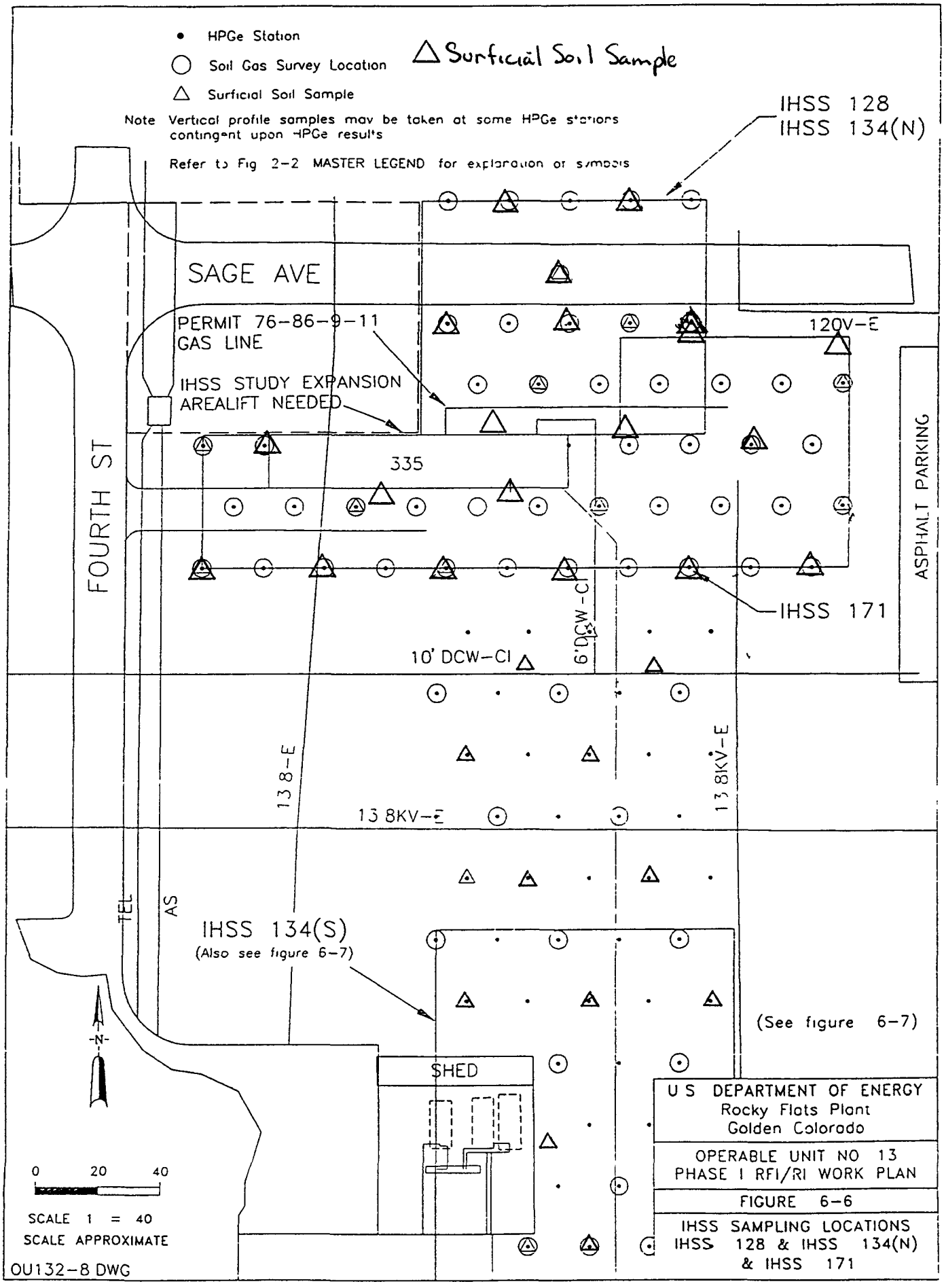
N

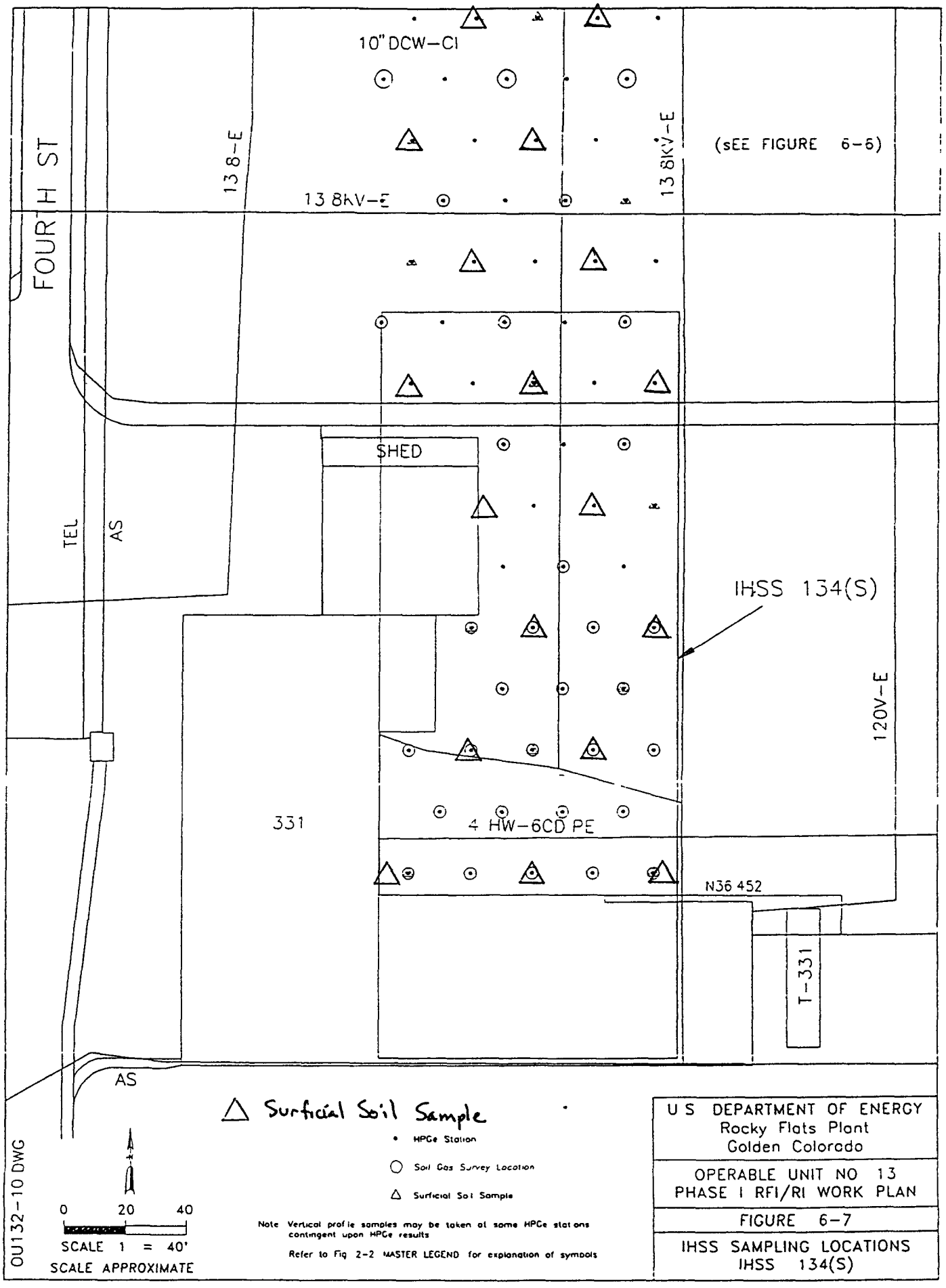
0 40 80

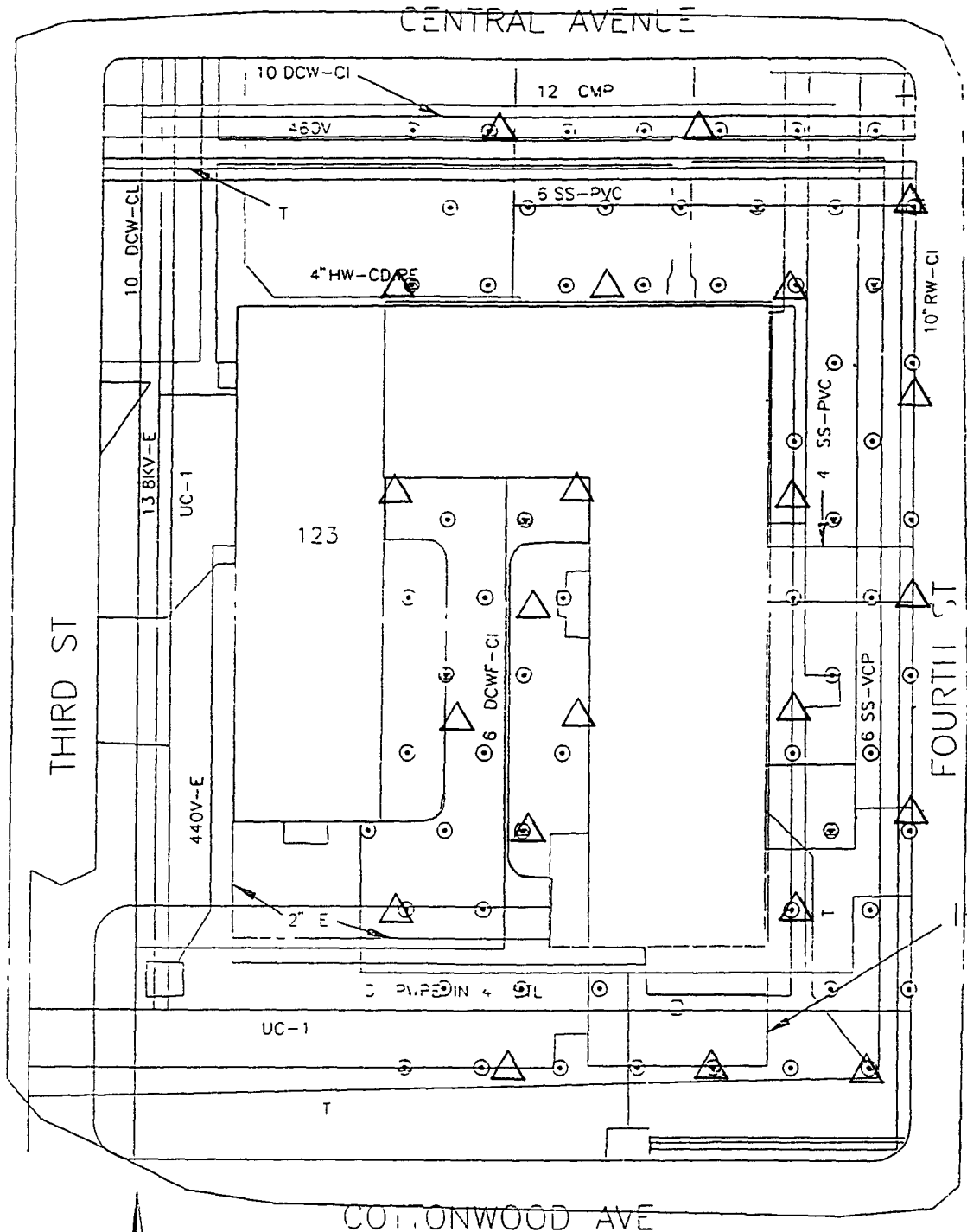
SCALE 1 = 80

U S DEPARTMENT OF ENERGY Rocky Flats Plant Golden Colorado
OPERABLE UNIT NO 13 PHASE I RFI/RI WORK PLAN
FIGURE 6-5
IHSS SAMPLING LOCATIONS IHSS 117 3 & IHSS 152

OU132-6 DWG


HPGe Station
Soil Gas Survey Location
Surficial Soil Sample
△ Surficial Soil Sample
Note Vertical profile samples may be taken at some HPGe stations contingent upon HPGe results
Refer to Fig 2-2 MASTER LEGEND for explanation of symbols
IHSS 128
IHSS 134(N)
SAGE AVE
PERMIT 76-86-9-11
GAS LINE
IHSS STUDY EXPANSION
AREALIFT NEEDED
120V-E
FOURTH ST
335
ASPHALT PARKING
IHSS 171
6' DCW-CI
10' DCW-CI
13 8-E
13 8KV-E
13 8KV-E
TEL
AS
IHSS 134(S)
(Also see figure 6-7)
(See figure 6-7)
SHED
N
0 20 40
SCALE 1 = 40
SCALE APPROXIMATE
OU132-8 DWG
U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado
OPERABLE UNIT NO 13
PHASE I RFI/RI WORK PLAN
FIGURE 6-6
IHSS SAMPLING LOCATIONS
IHSS 128 & IHSS 134(N)
& IHSS 171


10" DCW-CI
FOURTH ST
13 8-E
13 8kV-E
13 8kV-E
(sEE FIGURE 6-6)
SHED
TEL
AS
IHSS 134(S)
120V-E
331
4 HW-6CD PE
N36 452
T-331
AS
Surficial Soil Sample
HPGe Station
Soil Gas Survey Location
Surficial Soil Sample
Note Vertical profile samples may be taken at some HPGe stations contingent upon HPGe results
Refer to Fig 2-2 MASTER LEGEND for explanation of symbols
0 20 40
SCALE 1 = 40'
SCALE APPROXIMATE
OU132-10 DWG
U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado
OPERABLE UNIT NO 13
PHASE I RFI/RI WORK PLAN
FIGURE 6-7
IHSS SAMPLING LOCATIONS
IHSS 134(S)



△ Surficial Soil Sample

- HPGe Station
- Soil Gas Survey Location
- △ Surficial Soil Sample
- Borehole Location

0 20 40

SCALE 1" = 40
SCALE APPROXIMATE

Note Vertical profile samples may be taken at some HPGe stations contingent upon HPGe results

Refer to Fig 2-2 MASTER LEGEND for explanation of symbols

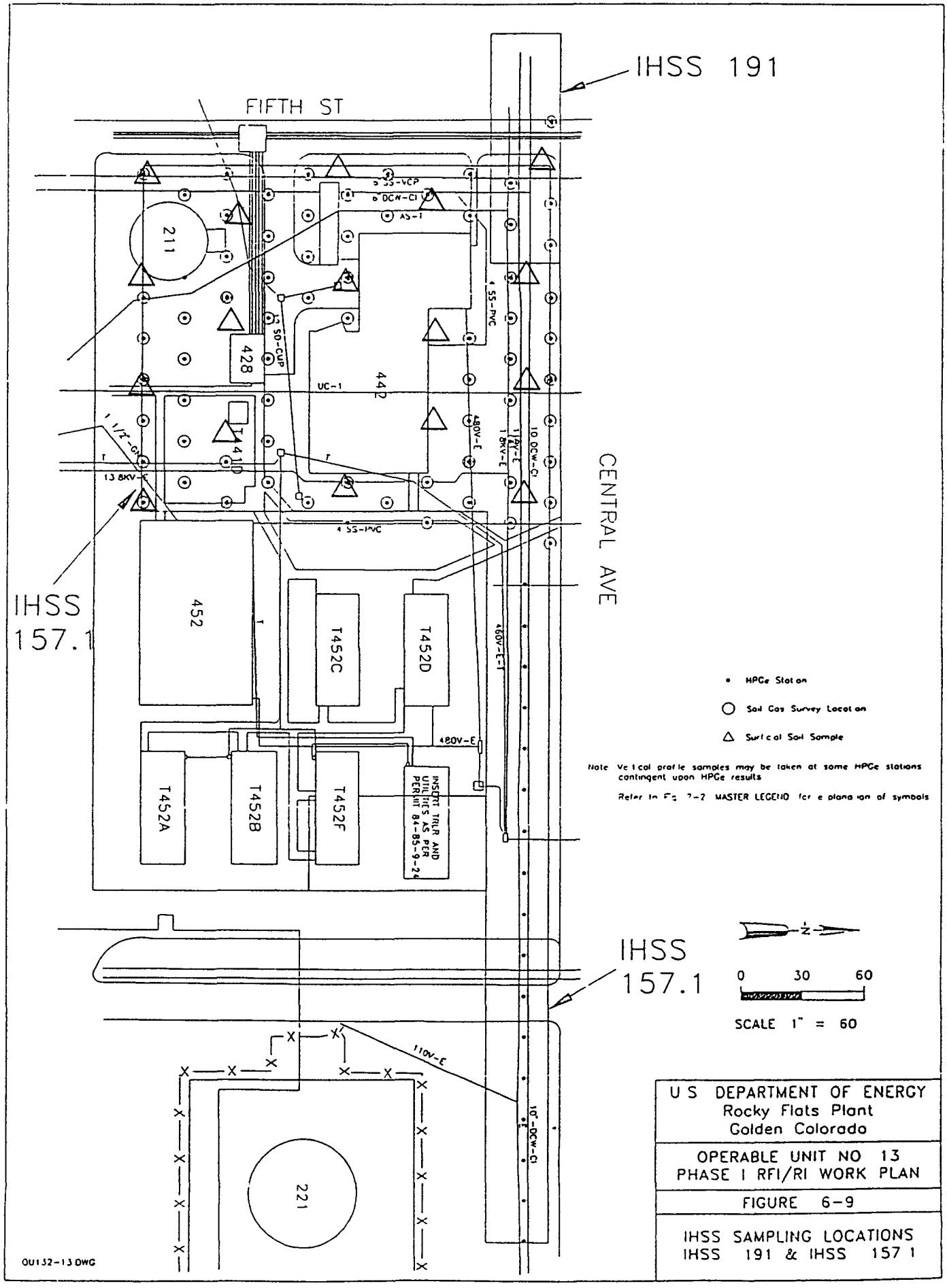
OU132-11 DWG

U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

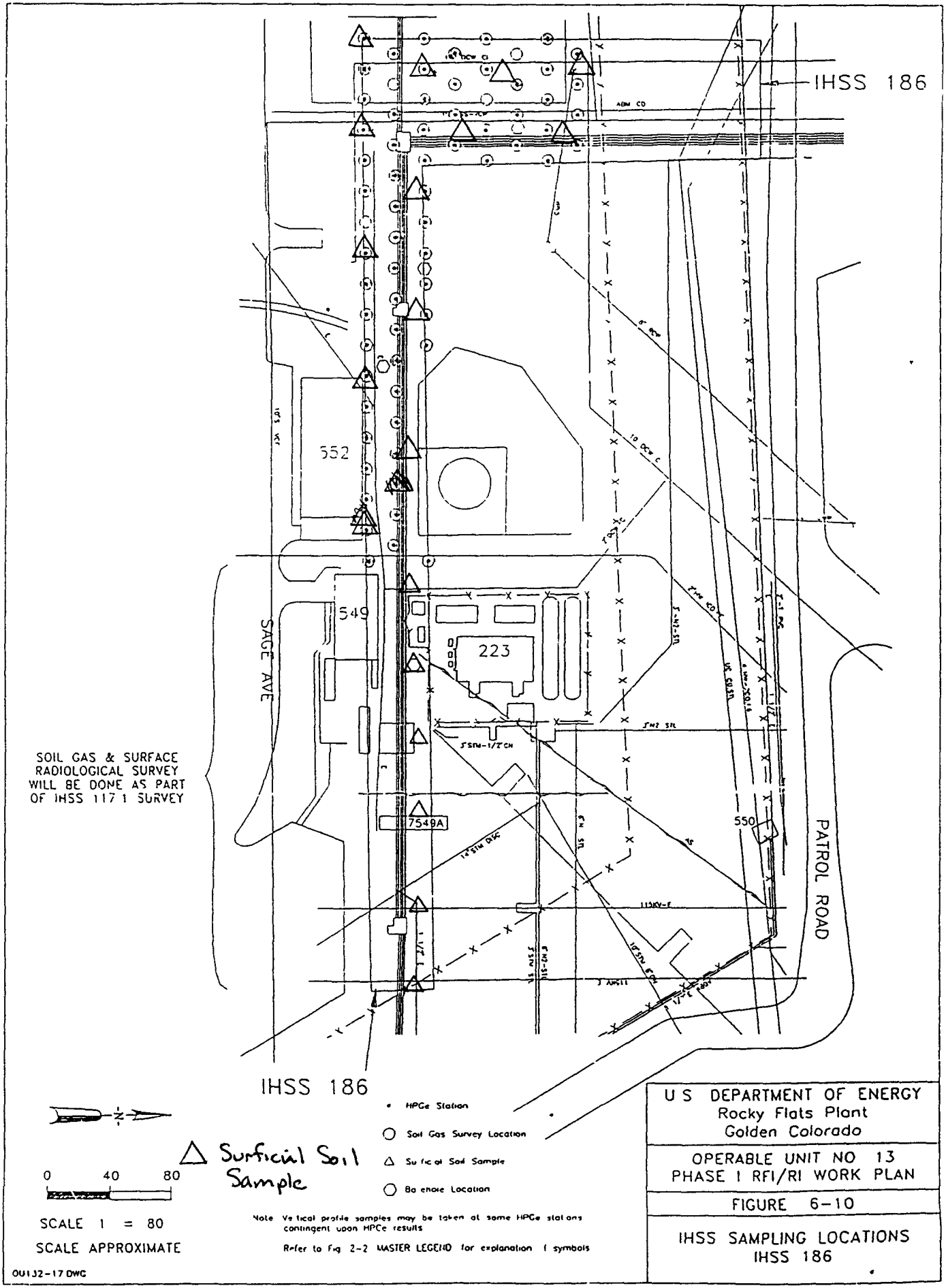
OPERABLE UNIT NO 13
PHASE I RFI/RI WORK PLAN

FIGURE 6-8

IHSS SAMPLING LOCATIONS
IHSS 148



U S DEPARTMENT OF ENERGY Rocky Flats Plant Golden Colorado
OPERABLE UNIT NO 13 PHASE I RFI/RI WORK PLAN
FIGURE 6-9
IHSS SAMPLING LOCATIONS IHSS 191 & IHSS 157 1



U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO 13
PHASE I RFI/RI WORK PLAN

FIGURE 6-10

IHSS SAMPLING LOCATIONS
IHSS 186